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# IDENTIFICATION OF TRENDS IN LAND USE/LAND COVER CHANGES IN THE MOUNT CAMEROON FOREST REGION

By

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# Introduction

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International debate on natural resources management in the tropics focuses on:

- Deforestation
- Forest conversion
- Consequences or impact
- The way the process of change can be managed



# Introduction continuous

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- Therefore the Integration and analysis of the remote sensing and spatially explicit data helps in our understanding of land-use/land-cover change
- There is need to combine this complexity into analysis of land-cover-change process to comprehend their causes and predict likely evolutions based on models

# Problem Statement

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- Tropical landscapes are undergoing rapid anthropogenic changes, particularly involving losses of forest so there is much interest in the extent of tropical resources and the rates of destruction due to their influence on many environmental factors, including biodiversity and atmospheric greenhouse gas concentrations (Tucker and Townshend, 2000; Hens and Boon, 1999).
- The capabilities of RS and GIS for mapping and monitoring land change are burgeoning. So Scientists and policy makers need to understand the fundamental processes of land transformation in order to establish effective conservation and management strategies.



# Terminologies definition

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- Trends:

Refer to a shift over time among the relationships between the factors that shape the changing nature of human-environment relations.

# Research question

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- What are the distribution and rate of land cover changes in the study area during the period from 1990 – 2002?
- Which are the main socio-economic and biophysical factors governing land cover changes in the period 1990 – 2002?



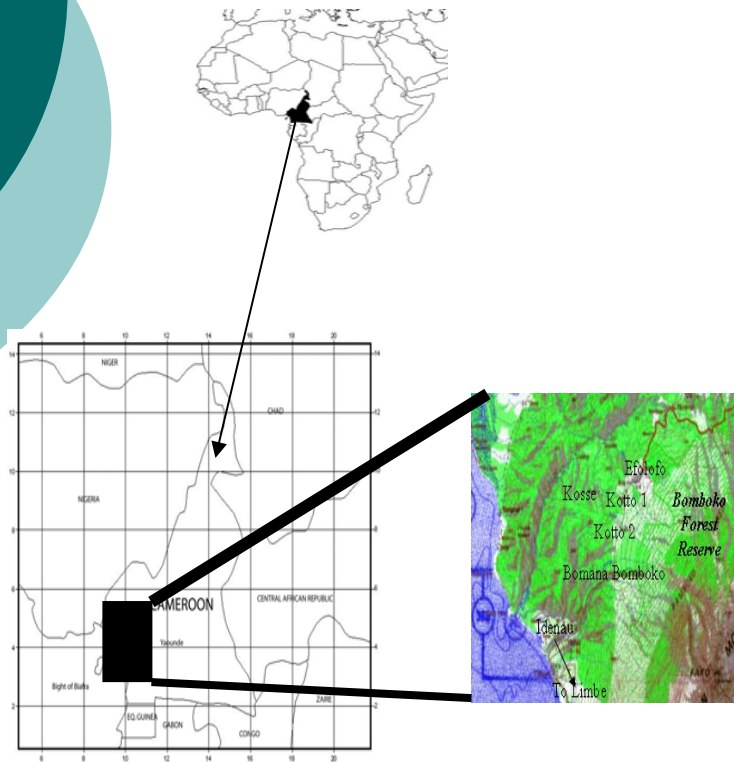
# Objective

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- To assess the trends of land cover change in the study area during the period from 1990 - 2002
- To analyse the relationship between the trend of the land cover changes and the underlying factors.



# Study area



- Located in the South-Western part of Cameroon
- It's the highest mountain in west and central Africa with an elevation of 4095 m.
- The region is Internationally recognised as a biodiversity hotspot with many endemic and endangered species of flora and fauna.
- High immigration due to agricultural land availability, presence of logging activities.
- The area is a sensitive zone to deforestation due to its road infrastructure.

# Methodology

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## Data Extraction –

- Two high-spatial resolution images (1990 and 2002) were downloaded from the GLCF website (<http://glcf.umiacs.umd.edu/index.shtml>)
- -Erdas Imagine 8.6; image pre-processing and thematic information extraction, digital change detection.

## Data analysis – *Land cover classification*

- •Maximum likelihood classifier was used with *Pixels assigned to the mostly likely class based on a comparison of the posterior probability that it belongs to each of the signatures being considered*)



# Methodology continued

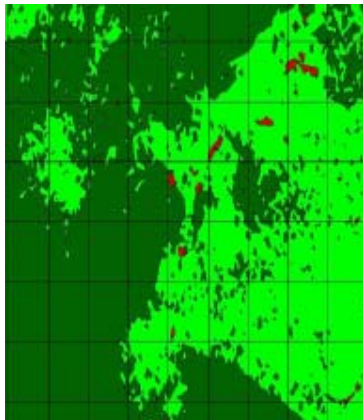
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- Contingency tables between ref. data and remote sensing-based classification were produced, and the overall accuracy was computed
- Land-cover-change Analysis was conducted with Post-comparison (overlying and comparing two successive land cover classifications) – leading to categorical map.

# Result

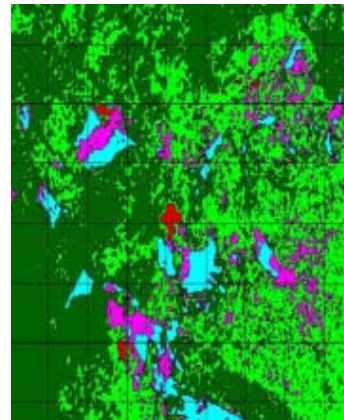
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## ○ Image Classification



- Open Forest
- Dense Forest
- Bare Land

Classified Image\_1990



- Open Forest
- Dense Forest
- Agriculture
- Plantations
- Bare land

Classified Image\_2002

# Result

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Five land-cover classes were identified with high level of accuracy as shown in the Contingency Table below:

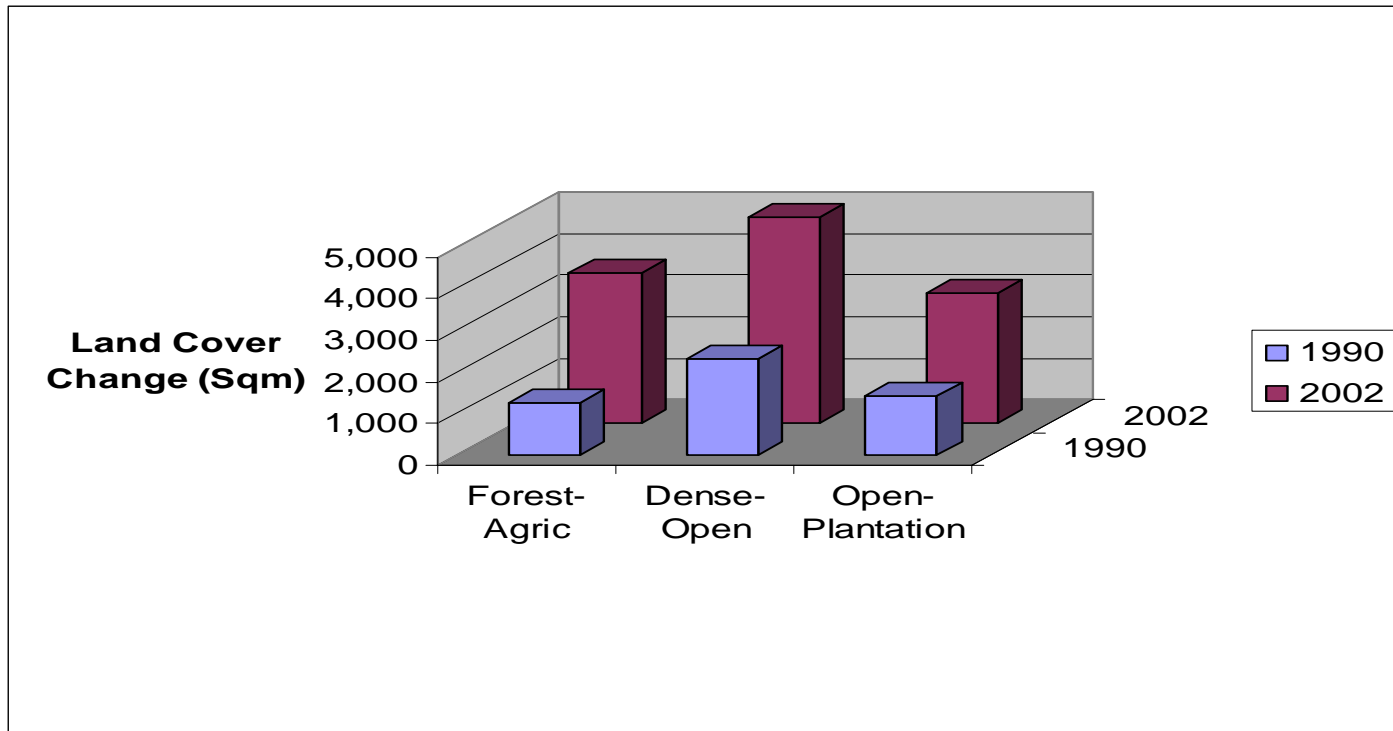
|                 | Reference Data |             |        |           |            |       |          |
|-----------------|----------------|-------------|--------|-----------|------------|-------|----------|
| Classified Data | Dense Forest   | Open Forest | Agric. | Bare land | Plantation | Total | Accuracy |
| Dense Forest    | 51             | 3           | 0      | 0         | 0          | 54    | 0.94     |
| Open Forest     | 2              | 51          | 2      | 1         | 0          | 56    | 0.91     |
| Agriculture     | 0              | 1           | 47     | 3         | 1          | 52    | 0.9      |
| Bare Land       | 0              | 1           | 3      | 44        | 2          | 50    | 0.88     |
| Plantation      | 0              | 1           | 1      | 4         | 44         | 50    | 0.88     |
| Total           | 53             | 57          | 53     | 52        | 47         | 262   |          |

Overall accuracy = 0.9

# Result Continous

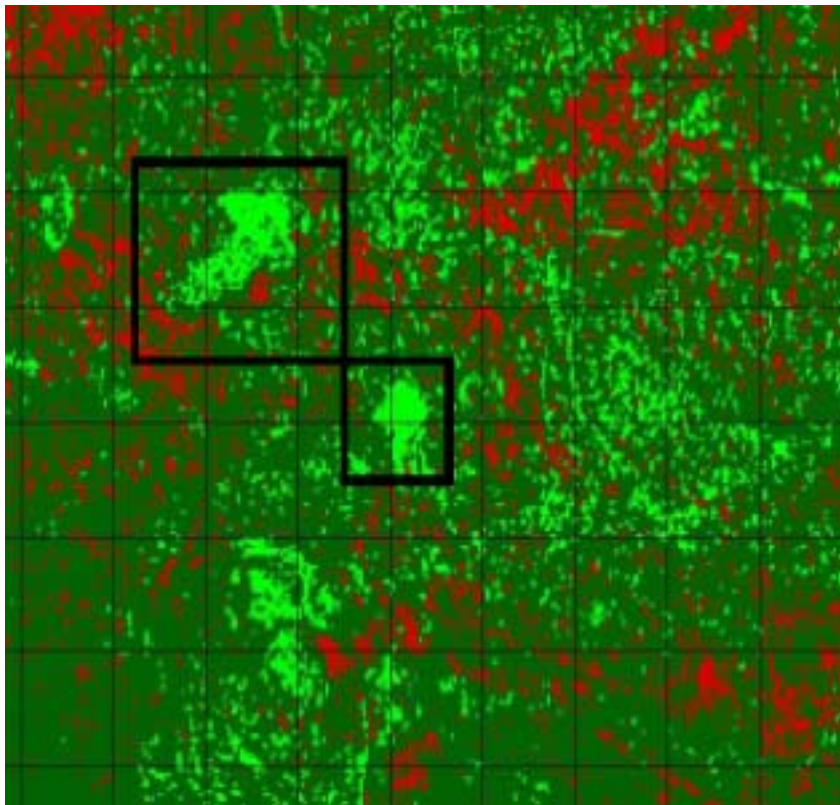
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- Land Cover-Change Analysis –  
Results indicate a net reduction in forest cover area



# Results on Trends in Land cover Change

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- Forest to Agric
- Dense to Open
- Open to Plantation

# Discussion

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- From the classification carried out, the change detection delineated two categories of land cover change that is deforestation and forest regrowth areas. Some of the deforested areas are mostly forest areas cleared for the establishment of agricultural plantations (mostly large scale commercial plantations) coupled with indiscriminate logging by logging companies.
- The research also revealed that the trend in land cover change in the study area is not a simple straight forward process because one cover class changes to other class and finally change to the original again( e.g dense forest changing to open forest and later becoming dense forest again).
- From the research, I was able to identify that three proximate factors are responsible for the trend in land cover change in the study area (extraction of wood, expansion of agricultural areas and extension of settlement) and these factors occur in different forms.



# Conclusion

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- Landsat TM is an important source of data for mapping trends in land cover change in tropical areas. However cloud cover can limit the usefulness of this important data because as high as 30% of the information on one of the images used in the research work was obscured by cloud coverage.
- Classification of multispectral satellite data and comparison of land cover maps is an essential tool for assessing large-scale land cover/land use changes. However, this research project left a plenty of open space remaining for future improvement. Except map overlay and visual comparison of classified maps with training sites, there was no empirical validation of classification accuracy involved in the analytical process.

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**THANK YOU**